

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing: 21 September 2000 (21.09.00)	
International application No.: PCT/NL00/00165	Applicant's or agent's file reference: P48546PC00
International filing date: 10 March 2000 (10.03.00)	Priority date: 15 March 1999 (15.03.99)
Applicant: SIEPEL, Ugo et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International preliminary Examining Authority on:

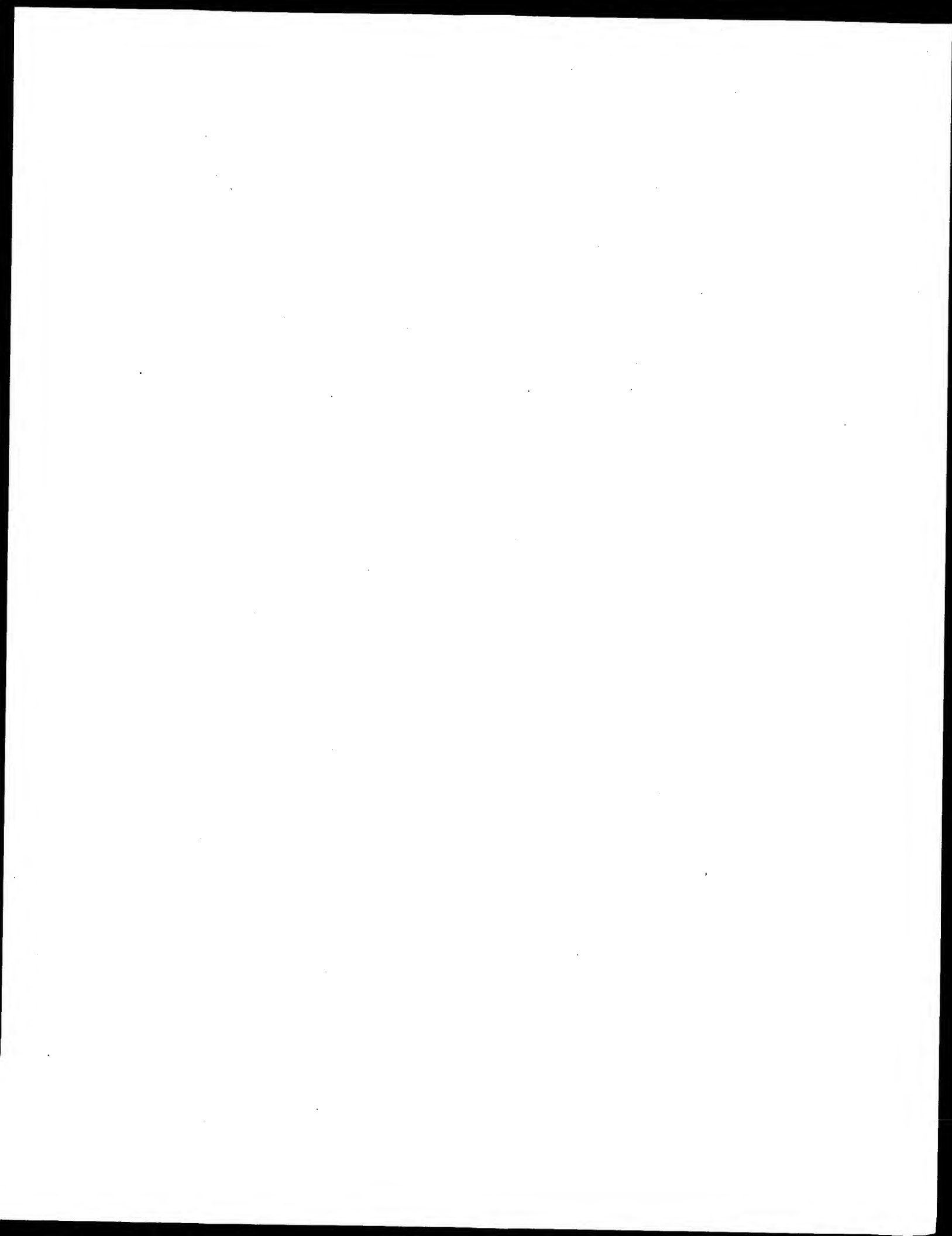
11 July 2000 (11.07.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer: J. Zahra Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P48546PC00	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NL 00/ 00165	International filing date (day/month/year) 10/03/2000	(Earliest) Priority Date (day/month/year) 15/03/1999
Applicant COÖPERATIEVE VERKOOP- EN PRODUCTIEVERENIGING VAN A		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.



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Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The invention relates to a composition for use in preparing an expanded foodstuff such as snacks, said composition comprising at least a non-cereal amylopectin starch. It is a further object of the present invention to provide a method for obtaining an expanded foodstuff having improved expansion characteristics. Said composition, such as dough, at least comprising a non-cereal amylopectin starch, such as that isolated from potato tubers or tapioca. The preparation is carried out by heating at least part of the composition to a temperature above its glass transition temperature and letting it cool to below said glass transition temperature.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/AL 00/00165

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A23L1/0522 A23L1/164 A23L1/217

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 634 596 A (EASTMAN JAMES E.) 6 January 1987 (1987-01-06) ---	1, 5, 10, 13
A	HOVENKAMP-HERMELINK J H M ET AL: "ISOLATION OF AN AMYLOSE-FREE STARCH MUTANT OF THE POTATO (SOLANUM TUBEROSUM L.)" THEORETICAL AND APPLIED GENETICS, vol. 75, no. 1, 1 December 1987 (1987-12-01), pages 217-221, XP000610709 ISSN: 0040-5752 cited in the application ---	
A	EP 0 565 386 A (UNILEVER PLC.) 13 October 1993 (1993-10-13) ---	5, 10, 13
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

5 May 2000

Date of mailing of the international search report

12/05/2000

Name and mailing address of the ISA

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Authorized officer

Caturla Vicente, V



INTERNATIONAL SEARCH REPORT

International Application No

PCT/ISA/210 00/00165

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 652 010 A (GIMMLER ET AL.) 29 July 1997 (1997-07-29) ---	10, 15
A	US 5 523 106 A (GIMMLER ET AL.) 4 June 1996 (1996-06-04) ---	1
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IL 00/00165

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 00/00165

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : A23L 1/0522, 1/164, 1/217	A1	(11) International Publication Number: WO 00/54606 (43) International Publication Date: 21 September 2000 (21.09.00)
(21) International Application Number: PCT/NL00/00165 (22) International Filing Date: 10 March 2000 (10.03.00) (30) Priority Data: 99200796.3 15 March 1999 (15.03.99) EP (71) Applicant (for all designated States except US): COÖPERATIEVE VERKOOP- EN PRODUCTIEV- ERENIGING VAN AARDAPPELMEEL EN DERIVATEN AVEBE B.A. [NL/NL]; Beneden Oosterdiep 27, NL-9641 JA Veendam (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): <u>SIEPEL, Ugo</u> [NL/NL]; Grote Vaartlaan 53, NL-9642 PB Veendam (NL). <u>BUWALDA, Pieter, Lykle</u> [NL/NL]; Mondriaanstraat 32, NL-9718 MJ Groningen (NL). (74) Agent: OTTEVANGERS, S., U.; Vereenidge Octrooibureaux, Nieuwe Parklaan 97, NL-2587 BN The Hague (NL).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: INGREDIENTS FOR EXPANDED FOODS (57) Abstract The invention relates to a composition for use in preparing an expanded foodstuff such as snacks, said composition comprising at least a non-cereal amylopectin starch. It is a further object of the present invention to provide a method for obtaining an expanded foodstuff having improved expansion characteristics. Said composition, such as dough, at least comprising a non-cereal amylopectin starch, such as that isolated from potato tubers or tapioca. The preparation is carried out by heating at least part of the composition to a temperature above its glass transition temperature and letting it cool to below said glass transition temperature.		



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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁷ : A23L 1/0522, 1/164, 1/217	A1	(11) International Publication Number: WO 00/54606 (43) International Publication Date: 21 September 2000 (21.09.00)
(21) International Application Number: PCT/NL00/00165 (22) International Filing Date: 10 March 2000 (10.03.00) (30) Priority Data: 99200796.3 15 March 1999 (15.03.99) EP (71) Applicant (for all designated States except US): COÖPERATIEVE VERKOOP- EN PRODUCTIEV- ERENIGING VAN AARDAPPELMEEL EN DERIVATEN AVEBE B.A. [NL/NL]; Beneden Oosterdiep 27, NL-9641 JA Veendam (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): SIEPEL, Ugo [NL/NL]; Grote Vaartlaan 53, NL-9642 PB Veendam (NL). BUWALDA, Pieter, Lykle [NL/NL]; Mondriaanstraat 32, NL-9718 MJ Groningen (NL). (74) Agent: OTTEVANGERS, S., U.; Vereenigde Octrooibureaux, Nieuwe Parklaan 97, NL-2587 BN The Hague (NL).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i>
(54) Title: INGREDIENTS FOR EXPANDED FOODS (57) Abstract The invention relates to a composition for use in preparing an expanded foodstuff such as snacks, said composition comprising at least a non-cereal amylopectin starch. It is a further object of the present invention to provide a method for obtaining an expanded foodstuff having improved expansion characteristics. Said composition, such as dough, at least comprising a non-cereal amylopectin starch, such as that isolated from potato tubers or tapioca. The preparation is carried out by heating at least part of the composition to a temperature above its glass transition temperature and letting it cool to below said glass transition temperature.		

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Title: Ingredients for expanded foods.

The invention relates to expansion of foodstuff, in particular to the production of expanded food items such as snacks.

Expanded foods are well-known to every consumer. Their
5 highly aerated texture is appreciated in toast, snacks, crackers and a multitude of other products that are often eaten snack wise. In general, expansion of a certain product is achieved by heating a composition such as a dough to a temperature above its glass transition temperature and then
10 expanding it, for example by applying a gas which blows the plasticised mass to a foam. This foam is subsequently brought to below its glass transition temperature whereby the expanded dough settles resulting in a stable, glassy or crispy and expanded foam.

15 Perhaps the best known example of such an expanded product is popcorn. The corn is heated well above the glass transition temperature of the starch. At this temperature water boils vigorously and the resulting steam blows the corn kernel to a foam (the popping). Since water is a very efficient plasticiser
20 for starches, the release of water results in a sharp increase in the glass transition temperature. As a result the popcorn is frozen into its well-appreciated tender and crispy form.

Apart from flavour, texture is the second most important criterion in determining the acceptability and attractiveness
25 of a food product. For many products the crispiness and extent of expansion mainly govern the sensation of texture. Examples of expanded products are extruded snacks, crackers, cookies, coated nuts, Japanese style snacks, some types of confectionery, dry roasted nuts, chip-like products, etc. In
30 general, such snacks are best appreciated when they are most expanded, i.e. contain the most air and are most brittle. Often such snacks are also described as being light and crispy.

As already mentioned glass transition temperature and the influence of water on this temperature can govern the
35 expansion. All starches have their own typical glass transition

at a fixed moisture content as is described in J.-L. Jane et al, "Effects of starch chemical structures on gelatinisation and pasting properties" in *Zywnosc Technologiczna* 4(17) 63-71, Cracow 1998. Apart from these factors the viscosity and the visco-elasticity are also important factors in governing the foaming properties of plasticised materials.

Degrees of crispiness and expansion are often achieved by varying process conditions and formula aspects. For example in snack preparations often a mixture of starches, flour and a (most times limited) amount of water is prepared. A process step is carried out such as extrusion, sheeting or coating in order to bring the dry or semi-dry mix, dough or batter into a certain shape or condition. Final process steps can be drying, baking or frying, through which expansion is obtained as described above.

Yet another typical example of expanded foodstuff are puffed snacks. Farinaceous materials are formed into pellets with a distinct shape. Heating the pellets for instance through frying or with a puffing gun results in the desired snack. Also, fabricated corn or potato chips are an important factor in the market. In U.S. Patent 3,576,647 a process is described in which the preparation of chip-like expanded products is described. In U.S. Patent 5,500,240 the application of pregelatinised waxy maize starch for the production of (potato) chip like products is described. The machinability of the transient dough is rather good, resulting in low fat chip-like products. No remarks with respect to expansion are made. However, the application of cereal starches in potato or other non-cereal snacks may lead to off taste products.

For foodstuff, it is in general desirable that a starch be bland or neutral in flavour. The starches generally having the most neutral taste are non-cereal, such as tuber- or root-type, starches, such as potato or tapioca, when compared to starches such as corn, wheat, rice, sorghum, waxy maize and waxy sorghum, which, when incorporated into food, give some undesirable flavour (peculiar to the starch) to the food. These off-flavours have been described by some individuals as 'woody', 'corny', 'starchey', 'bitey' or 'chalkey', and these

flavours often come out most poignant after heat treatment, amongst others because cereal starches contain considerable amounts of lipids and proteins, when compared to non-cereal starches.

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It is an object of the present invention to provide expanded foodstuff, and methods of obtaining these, having improved expansion characteristics, containing more air or being even more light and/or crispy over comparable expanded foodstuffs that have been traditionally on the market. It is a further object of the present invention to provide expanded foodstuff wherein the starch used has a unpronounced or neutral taste.

The invention provides a method for obtaining an expanded foodstuff having improved expansion characteristics comprising preparing a composition, such as a dough, coating mix, pre-mix, etc, at least comprising a non-cereal amylopectin starch, heating at least part of said composition to a temperature above its glass transition temperature, i.e. expanding said heated composition and letting it cool to below said glass transition temperature. As referred to herein, non-cereal amylopectin starch is a starch isolated from non-cereals, such as potato tubers or tapioca and having an amylopectin content typically more than 90 wt.%, preferably of at least 95 wt.%, and preferably at least 98 wt.%, or even at least 99 wt.%, based on dry substance.

Due the presence of the non-cereal amylopectin starch, preferably a starch having an amylopectin content of at least 90 weight percent based on dry substance of said starch in said composition, an improved expansion is obtained. In a preferred embodiment, a method according to the invention is provided wherein said starch is derived from a potato.

The invention also provides a composition for use in preparing an expanded foodstuff, said composition at least comprising a non-cereal amylopectin starch. Such a composition is for example a dough, (tempura or fritter) batter, mix or ready-to-use pre-mix to which for example only water need to be added for preparing a dough or batter, said composition

optionally containing other starches, carbohydrates, fats, proteins, flavours, salts, or other food components. In a preferred embodiment a composition according to the invention is provided wherein said non-cereal amylopectine starch has an amylopectin content of at least 90 weight percent based on dry substance. It is preferred that at least 10%, more preferably at least 25% of the starch fraction in said expanded products comprises non-cereal amylopectine starch, be it native non-cereal amylopectin starch or a non-cereal amylopectin starch derivative, to provide for the expansion characteristics desired for the type of expanded food product.

The invention also provides an expanded foodstuff comprising a non-cereal amylopectin starch. Examples of such foodstuff as provided by the invention are extruded snacks, crackers, cookies, doughnuts, chip-like products, Japanese style snacks, some types of confectionery, or coated foodstuff such as coated nuts, dry roasted nuts, fritter or tempura type products, etc., or food coatings, such as snack coatings, bread coatings, French fries coatings, and pre-mixes therefor, comprising a non-cereal amylopectin starch, particularly those comprising starch or starch granules containing more than 90 or 95%, and usually more than 98% of amylopectin.

The present invention in particular relates to expanded products in which amylopectin starch or derivatives thereof are applied as to impart expansion properties. It has been provided by the invention that use of non-cereal amylopectin starch, and non-cereal amylopectin starch derivatives for the preparation of expanded foodstuffs induces unexpected high expansion when compared to other starches. Most starches typically consist of granules in which two types of glucose polymers are present. These are amylose (15-35 wt.% on dry substance) and amylopectin (65-85 wt.% on dry substance). Amylose consists of unbranched or slightly branched molecules having an average degree of polymerisation of 100 to 5000, depending on the starch type. Amylopectin consists of very large, highly branched molecules having an average degree of polymerisation of 1,000,000 or more. The commercially most important starch types (maize starch, potato starch, wheat starch and tapioca starch) contain 15 to 30 wt.% amylose. For some cereal types, such as barley,

maize, millet, wheat, milo, rice and sorghum, varieties are known of which the starch granules nearly completely consist of amylopectin. Calculated as weight percent on dry substance (wt.%), these starch granules contain more than 95%, and usually more than 98% of amylopectin. The amylose content of these cereal starch granules is therefor less than 5%, and usually less than 2%. The above cereal varieties are also referred to as waxy cereal grains, and the amylopectin starch granules isolated therefrom as waxy cereal starches.

In contrast with the different cereals, starch granules of non-cereal starches, such as root and tuber varieties, that (nearly) exclusively consist of amylopectin are traditionally not known in nature. For instance, potato starch granules isolated from potato tubers usually contain about 20% amylose and 80 % amylopectin. During the past 10 years, however, successful efforts have been made to cultivate by genetic modification non-cereals, such as potato plants which, for example in the potato tubers, form starch granules consisting for more than 95 wt.% of amylopectin. It has even been found feasible to produce potato tubers comprising substantially only amylopectin.

In the formation of starch granules, different enzymes are catalytically active. Of these enzymes, the granule bound starch synthase (GBSS) is involved in the formation of amylose. The presence of the GBSS enzyme depends on the activity of genes encoding for said GBSS enzyme. Elimination or inhibition of the expression of these specific genes results in the production of the GBSS enzyme being prevented or limited. The elimination of these genes can be realised by genetic modification of potato plant material or by selection for plants having a recessive mutation, preferably in homozygous form, of said gene. An example of the latter is the amylose-free mutant of the potato (amf) of which the starch substantially only contains amylopectin through a recessive mutation in the GBSS gene. This mutation technique is described in, inter alia, J.H.M. Hovenkamp-Hermelink et al., "Isolation of amylose-free starch mutant of the potato (*Solanum tuberosum* L.)", *Theor. Appl. Gent.*, (1987), 75:217-221" and E. Jacobsen et. al., "Introduction of an amylose-free (amf), mutant- into

breeding of cultivated potato, *Solanum tuberosum* L.,
Euphytica, (1991), : 53:247-253.

Elimination or inhibition of the expression of the GBSS
gene in the plant is also possible by using so-called antisense
5 inhibition. Genetic modification of for example potato is
described in R.G.F. Visser et al., "Inhibition of the
expression of the gene for granule-bound starch synthase in
potato by antisense constructs", Mol. Gen. Genet., (1991),
225:289-296. By using genetic modification, it has been found
10 possible to cultivate and breed non-cereal roots and tubers,
for instance potato, yam, or cassava (Patent South Africa
97/4383), of which the starch granules. contain little or no
amylose. As referred to herein, non-cereal amylopectin starch
is the starch isolated from non-cereals such as potato tubers
15 or tapioca and having an amylopectin content typically more
than 90 wt.%, preferably of at least 95 wt.%, and preferably at
least 98 wt.%, or even at least 99 wt.%, based on dry
substance.

Regarding production possibilities and properties, there
20 are significant differences between amylopectin potato starch
on the one hand, and the waxy cereal starches on the other
hand. This particularly applies to waxy maize starch, which is
commercially by far the most important waxy cereal starch. The
cultivation of waxy maize, suitable for the production of waxy
25 maize starch is not commercially feasible in countries having a
cold or temperate climate, such as The Netherlands, Belgium,
England, Germany, Poland, Sweden and Denmark. The climate in
these countries, however, is suitable for the cultivation of
potatoes. Tapioca starch, obtained from cassava, may be
30 produced in countries having a warm and moist climate, such as
is found in regions of South East Asia and South America.
The composition and properties of root and tuber starch, such
as amylopectin potato starch and amylopectin tapioca starch,
differs from those of the waxy cereal starches. Amylopectin
35 potato starch, for example has a much lower content of lipids
and proteins than the waxy cereal starches. Problems regarding
off taste, odour and foaming, which, because of the lipids
and/or proteins, may occur when using waxy cereal starch
products (native and modified), do not occur, or occur to a

much lesser degree when using corresponding amylopectin potato starch products.

Furthermore, in contrast to the waxy cereal starches, amylopectin potato starch contains chemically bound phosphate groups. As a result, amylopectin potato starch products in a dissolved state have a distinct polyelectrolyte character. In the present invention non-cereal amylopectin starch and non-cereal amylopectin starch derivatives are applied in expanded food products. In relation to the same products based on other starches, the products based on non-cereal amylopectin starch show very good expansion properties. In some cases unmodified non-cereal amylopectin starch, such as for example derived from potato, even outperforms traditionally applied modified waxy cereal starch derivatives.

In one embodiment of the present invention unmodified, native non-cereal amylopectin starch, preferably derived from potato, is used in expanded products. The unmodified starch may or may not be pregelatinised by drum drying, spray cooking, spray drying, extrusion or heating in aqueous alcohol.

In a further embodiment the application of non-cereal amylopectin starch derivatives in expanded products is provided. The starch derivative may or may not be a cold water swellable derivative obtained using the methods described above.

The starch derivative may be a cross-linked starch, wherein said cross-linking is achieved by using sodium trimetaphosphate, phosphorus oxytrichloride or adipic anhydride, using for example a method known in the art. These cross-linking agents are most suitable for use in the food industry but others can also be contemplated.

The starch may be stabilised by treatment with acetic anhydride, vinyl acetate, or comparable agents. The starch may be stabilised by hydroxypropylation. Stabilisation by hydroxyalkylation of starch is, for example obtained with reagents containing a halohydrin, or an epoxide group as reactive site. The addition of hydroxypropyl groups is generally performed in aqueous suspensions of starch using propylene oxide, under alkaline conditions. The starch may also be derivatised by a combination of cross-linking and

stabilisation. Cross-bonding and/or stabilising reagents are in general reacted with starch under alkaline conditions. Suitable alkali materials are: sodium hydroxide, potassium hydroxide, ammonium hydroxide, magnesium hydroxide, sodium carbonate and trisodiumphosphate. Preferred are the alkali metal hydroxides and carbonates, most preferred are sodium hydroxide and sodium carbonate. Sometimes salts are added as to prevent swelling under alkaline reaction conditions. Preferred are sodium chloride and sodium sulphate.

The invention is further described in the detailed description and the examples therein without limiting the invention.

Detailed description

Example 1

Method for nut coating

Preparation of dry mix

A mixture is prepared of a native starch, here 400 g native potato starch, and a cold water swellable (pregelatinised) starch, here 200 g cold water swellable adipate acetate based on waxy maize starch. Herewith a dough coating is prepared of:

400 g starch mixture

80 g powdered sugar

10 g salt

10 g glutamate

water

Processing

Coat 400 g shelled peanuts in an Erweka AR 400 rotating coating pan (30 rpm, inclination of about 30°)

Pre-coating

During this experiment the nuts are kept rotating. 8 g of water is sprayed on the nuts. The nuts are dusted with a malto dextrin such as AVEBE's Paselli SA 2, Paselli MD 10, Paselli MD6 and again 10 g of water are sprayed on. Immediately afterwards 65 g of coating mix is dusted on the nuts.

Main coating

10

The main coating is performed in several steps according to a scheme for example as below.

step	spray with water (in g)	dust with coating mix (in g)
1	15	25
2	15	40
3	20	60
4	10	40
5	10	40
6	20	40
7	10	50
8	20	40

15 Final coating and processing steps

The nuts are dusted with 15 g of coating mix. Rotating is maintained for about 10 minutes.

20 Frying

The coated nuts were fried in oil at 155-160 °C for 5 minutes.

25 The cooled nuts were evaluated for organoleptic features. The volume of 200 g of coated nuts was measured in 1 L cylinder. The results are summarised in table 1, where example 1 is compared with examples 2 - 4.

Example 2

In example 2 potato starch was exchanged for amylopectin potato starch. The results are summarised in table 1.

Example 3.

Example 3 is a repetition of example 2 except that the cold swellable adipate/acetate based on waxy maize starch has been replaced by a none modified cold swellable waxy maize starch. The results are summarised in table 1.

Example 4.

Example 4 is a repetition of example 3 except that the cold swellable waxy maize starch has been replaced by a cold swellable amylopectin potato starch. The results are summarised in table 1.

Table 1.

Example nr	native starch	cold swellable starch		Crisp	Expan- sion	Volu me ml
		starch	modifica tion			
1	PS	WMS	Adipate/ acetate	4	6	550
2	APS	WMS	Adipate/ acetate	6	7	620
3	APS	WMS	none	5	6	520
4	APS	APS	none	8	8	650

Several conclusions can be derived from examples 1 - 4 and Table 1.

- changing the native starch from normal potato starch to amylopectin potato starch improves expansion and crispiness.

- upon changing the cold water swellable starch from modified waxy maize starch to unmodified waxy maize starch expansion and crispiness go down
- changing the cold water swellable starch from unmodified or modified waxy maize to unmodified amylopectin potato starch improves the expansion and crispiness.
- it is possible to avoid the off-taste brought in by the waxy maize starch by replacing it with a non-cereal amylopectin starch.

10 Example 5

Method

A dough was prepared of 14.4 kg of whole potato flakes (Rixona, German flakès), 5.80 kg of pregelatinised potato starch (with a moisture content of 9.3%), small components (0.39 kg of salt, 0.28 kg of sodium bicarbonate, 0.11 kg of citric acid, 0.14 kg of acid sodium pyrophosphate, 0.19 kg of sunflower oil, 0.11 kg lecithin) and 14.5 kg of water. The blend of dry ingredients is mixed for 30 seconds on low speed (52 rpm) in a high speed mixer. Oil and lecithin are added and mixed in for 2 minutes at high speed (104 rpm). Water is added and mixing is continued for 2.5 minutes. The dough is left to rest for 60 minutes. A biscuit line is fed with dough and the thickness of the dough is brought down to 0.6 cm. Round pieces are cut and dockered. The products are baked in a continuous oven with two zones (front: 215 °C, back: 185 °C) for 2.8 minutes.

The final products were evaluated for expansion, hardness in bite and crispiness. The results are summarised in table 2.

30 Expansion measurement

The weight of the amount used to fill a 2 l measuring cylinder with baked snacks was determined. The results were expressed as the volume which is occupied by 200 g.

Example 6.

In example 6 the instant starch was derived from waxy maize starch. It proved very hard to prepare a workable dough from this starch. The results are summarised in table 2. It shows clearly that waxy maize starch induces less expansion in this application.

Example 7.

In example 7 the instant starch is a medium cross-linked potato starch derivatives. This example clearly shows that regular potato starch derivatives give low expansion values. The product is very hard also, which leads to a low appreciation.

Example 8.

In example 8 the instant starch is a low cross-bonded (STMP) amylopectin potato starch derivative. The results clearly show that this product has very good expansion characteristics and good crispiness.

Example 9.

In example 9 the instant starch is a medium cross-bonded amylopectin potato starch adipate/acetate. It can be seen that the food characteristics are still satisfactorily but less than the product from example 8.

Example 10.

In example 10 the starch derivative dosage is raised 50 % as compared to example. The resulting product has very good characteristics.

Example 11.

Example 11 is a repetition of example 7 except that a 40 % extra dosage of water has been added. This example shows that it is possible to obtain higher expansion values with regular starch derivatives, although the expansion is still not as high as with amylopectin potato starch derivatives and the final product is harder. A 40 % extra dosage of water is however in most cases not appreciated. When frying follows extrusion the fat will deteriorate more rapidly and in other processes more energy has to be applied in order to get the same dry crispy product.

Table 2.

Example nr	5	6	7	8	9	10	11
instant starch	APS	WMS	PS	APS	APS	APS	PS
modification	none	none	crossl.	crossl.	crossl. stab	crossl. stab.	crossl.
Level			medium	low	medium	medium	medium
Reagent			STMP	STMP	adip/ac	adip/ac	STMP
						*	**
Expansion ml	2410	1880	1610	2530	2170	2550	2100
hardness	2	2	4.5	2	2	2	3.5
crispiness	5	5	1	5	5	5	5

15 STMP= sodium trimetaphosphate, adip/ac = adipate/acetate

*= 1,5 fold dosage of starch, **= 40 % extra water dosage

CLAIMS

1. A method for obtaining an expanded foodstuff having improved expansion characteristics comprising preparing a composition at least comprising a non-cereal amylopectin starch, heating at least part of said composition to a
5 temperature above its glass transition temperature and letting it cool to below said glass transition temperature.
2. A method according to claim 1 wherein said composition is a dough.
3. A method according to claim 1 or 2 wherein said starch
10 has an amylopectin content of at least 90 weight percent based on dry substance.
4. A method according to anyone of claims 1 to 3 wherein said starch is derived from a potato.
5. A composition for use in preparing an expanded
15 foodstuff, said composition at least comprising a non-cereal amylopectin starch.
6. A composition according to claim 5 wherein said starch has an amylopectin content of at least 95 weight percent based on dry substance.
- 20 7. A composition according to claim 5 or 6 wherein said starch is derived from a potato.
8. A composition according to anyone of claims 5 to 7 wherein said starch is cross-linked.
9. A composition according to anyone of claims 5 to 8
25 wherein said starch is stabilised.
10. An expanded foodstuff at least comprising a non-cereal amylopectin starch.
11. An expanded foodstuff according to claim 10 wherein said starch has an amylopectin content of at least 95 weight
30 percent based on dry substance.
12. An expanded foodstuff according to claim 10 or 11 wherein said starch is derived from a potato.
13. Use of a non-cereal amylopectin starch for the preparation of an expanded foodstuff.

14. Use according to claim 13 wherein said starch is modified.

15. Use according to claim 13 or 14 wherein said foodstuff is a snack.

5 16. Use according to anyone of claims 13 to 15 wherein said foodstuff comprises a coating.

INTERNATIONAL SEARCH REPORT

International application No
PCT/ 00/00165

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/0522 A23L1/164 A23L1/217

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

G document member of the same patent family

Date of the actual completion of the international search

5 May 2000

Date of mailing of the international search report

12/05/2000

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/NL 00/00165

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

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International application No

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INTERNATIONAL SEARCH REPORT

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From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

PRINS, A.W. et al.
VEREENIGDE OCTROOIBUREAUX
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NL-2587 BN The Hague

PAYS-BAS

23 AUG 2001

NRF₂ 15-9-2001

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

TERMIN jaar	Bearing		Date of mailing (day/month/year)	20.08.2001
	Voor			
	def.			
	MAP			
Applicant's or agent's file reference		IMPORTANT NOTIFICATION		
P48546PC00				
International application No. PCT/NL00/00165		International filing date (day/month/year) 10/03/2000	Priority date (day/month/year) 15/03/1999	
Applicant COÖPERATIEVE VERKOOP- EN PRODUCTIEVERENIGING VAN A				

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/ European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Götz, K Tel. +49 89 2399-7381
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P48546PC00	<div style="display: flex; justify-content: space-between;"> <div>FOR FURTHER ACTION</div> <div>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)</div> </div>	
International application No. PCT/NL00/00165	International filing date (day/month/year) 10/03/2000	Priority date (day/month/year) 15/03/1999
International Patent Classification (IPC) or national classification and IPC A23L1/0522		
Applicant COÖPERATIEVE VERKOOP- EN PRODUCTIEVERENIGING VAN A		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of ² sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 11/07/2000	Date of completion of this report 20.08.2001
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 </div> </div>	Authorized officer Adechy, M Telephone No. +49 89 2399 8576



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00165

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-13 as originally filed

Claims, No.:

1-15 with telefax of 15/01/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00165

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-3,10
	No:	Claims	4-9, 11, 12-15
Inventive step (IS)	Yes:	Claims	1-3,10
	No:	Claims	4-9, 11, 12-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

**2. Citations and explanations
see separate sheet**

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet



Re Item I

Basis of the opinion

An assumption was made concerning claims 10 and 11, in which reference is made to "claim 5", whereas it probably means "claim 9". The present report is based on this assumption.

Re Item V

Reasoned statement under Article 35 (2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1) Reference is made to the following documents:

- D1: US-A-4 634 596 (EASTMAN JAMES E.) 6 January 1987 (1987-01-06)
- D2: HOVENKAMP-HERMELINK J H M ET AL: 'ISOLATION OF AN AMYLOSE-FREE STARCH MUTANT OF THE POTATO (SOLANUM TUBEROSUM L.)' THEORETICAL AND APPLIED GENETICS, vol. 75, no. 1, 1 December 1987 (1987-12-01), pages 217-221, XP000610709 ISSN: 0040-5752 cited in the application
- D3: EP-A-0 565 386 (UNILEVER PLC.) 13 October 1993 (1993-10-13)
- D4: US-A-5 652 010 (GIMMLER ET AL.) 29 July 1997 (1997-07-29)
- D5: US-A-5 523 106 (GIMMLER ET AL.) 4 June 1996 (1996-06-04)

2) Novelty Art. 33 (1) and (2) PCT

The subject matter of claim 1, regarding a method for obtaining expanded food comprising at least a non-cereal amylopectin starch material, which contains itself more than 90% of amylopectin, where "at least part of" the composition is heated above its glass transition temperature and cooled to below the said temperature, is not disclosed in the cited documents and therefore is regarded as novel. The proportion of amylopectin in the non-cereal amylopectin starch in the claimed method is not derivable from the prior art. The same applies to dependent claims 2 and 3, which are regarded as novel in relation with independent claim 1 they refer to.

The subject matter of claims 4 and 9, concerns respectively, a composition comprising at least a non cereal amylopectin starch and an expanded food product comprising the



said starch composition. D5 discloses the subject matter of said claims, since expanded snacks are divulged (p.3-4, p. 11 lines 35-52, claims), comprising a non-cereal starch material (potato). It can be stressed that the use of a potato juice in the composition of D5 is regarded as a source of non-cereal amylopectin starch. D4 (p. 5-9, claims) also discloses such a composition as well as an expanded food, since the presence of a non-cereal amylopectin starch is found (e.g. potato starch is mentioned).

D1 (p.3, claims) and D2 (results and discussion) also disclose the subject matter of claim 4. D1 discloses a product containing starch from various origins, including potato starch, therefore the presence of "at least a non-cereal amylopectin" is explicitly disclosed. Also, D2 discloses a mutant free amylose potato, containing only amylopectin, therefore it discloses a composition comprising a non-cereal amylopectin. In addition, the description (e.g. on p. 5 line 14-15) acknowledges the fact that a potato is a source of amylopectin starch. It should be stressed that an expression such as "for use in preparing an expanded food stuff" is not regarded as technical features in the context of a product claim, and thus is not taken into account to analyse novelty (although such a product must be suitable for use in a particular manufacturing process). One could argue that the said document states that such a potato is analogous to waxy maize (on p. 220, lines 9-10), however, there is no details concerning the properties which are analogous, and no indication stating that it is not suitable for use in the claimed process.

The subject matter of dependent claims 5 and 6 is also disclosed in D2, where at least 95% of the starch is a non-cereal amylopectin starch and derived from potato, being an amylose free potato itself.

The subject matter of dependent claims 7 and 8 is also disclosed in D1, which mentions that the starch material can be cross-linked and also stabilised (derivatisation process for example).

The subject matter of claim 11 concerning the nature of the non-cereal starch is also divulged in D4 and D5.

The subject matter of dependent claim 10, concerning the percentage of the amylopectin content in the non-cereal amylopectin starch (of at least 95%) is not



divulged in the cited document D5 and therefore is regarded as novel.

The subject matter of claim 12 concerns the use of a non-cereal amylopectin for making an expanded foodstuff. D4 (p. 5-9, claims) and D5 also disclose the subject matter of claim 12. Therefore, the subject matter of said claim is not regarded as novel, since the presence of a non-cereal amylopectin (from the potato) is involved in the whole process. The subject matter of dependent claims 13, 14 and 15 is also divulged in the said documents. The starch would be modified with a step of heating, also food snacks are the object of the cited documents, and the presence of a coating is part of conventional manufacturing procedures.

3) Inventive step Art. 33 (1) and (3) PCT

The problem underlying the present invention concerns a process for producing an expanded food having improved rheological and organoleptic properties. The problem is solved by using essentially a non-cereal amylopectin starch in a specific amount and applying specific physical conditions. The closest prior art is D5 concerning also a process for expanding food. It differs from the present invention in that the proportion of non-cereal amylopectin starch is not disclosed and there is no indication on the use of such an amount to solve the problem of the present invention.

The subject matter of claim 1 is regarded as involving an inventive step, since there is no indication that such a process, involving the presence of 90% of amylopectin in the non-cereal amylopectin starch could be carried out in order to achieve the result of the present application. Therefore, such a combination would not be obvious to the skilled person. The same applies to the subject matter of dependent claims 2 and 3, which are also regarded as involving an inventive step in relation to independent claim 1 they refer to.

The subject matter of claim 10 is regarded as involving an inventive step, since none of the prior art indicates that such a proportion of amylopectin in the non-cereal amylopectin starch would solve the problem of the present application.

The subject matter of independent claims 4, 9, 12 and that of dependent claims 5-8, 11 and 13-15, lacks inventive step. Since said subject matter is divulged in the cited prior



art (see section 2)), it does not show where an inventive step could lie.

Re Item VIII

Certain observations on the international application

The term "expanded foodstuff" found in the claims, is not clearly delimited and therefore is covered by the scope of the cited documents (Art. 6 PCT). It should also be stressed that the product claims are defined in such a broad way that their subject matter is disclosed in the prior art cited documents, and many conventional expanded food are encompassed by the subject matter of said claims.

Expression such as "at least part of" , found in claim 1 is vague and renders the subject matter of said claim unclear (Art. 6 PCT).

CLAIMS

1. A method for obtaining an expanded foodstuff having improved expansion characteristics comprising preparing a composition at least comprising a non-cereal amylopectin starch, heating at least part of said composition to a
5 temperature above its glass transition temperature and letting it cool to below said glass transition temperature.
2. A method according to claim 1 wherein said composition is a dough.
3. A method according to claim 1 or 2 wherein said starch
10 has an amylopectin content of at least 90 weight percent based on dry substance.
4. A method according to anyone of claims 1 to 3 wherein said starch is derived from a potato.
5. A composition for use in preparing an expanded
15 foodstuff, said composition at least comprising a non-cereal amylopectin starch.
6. A composition according to claim 5 wherein said starch has an amylopectin content of at least 95 weight percent based on dry substance.
- 20 7. A composition according to claim 5 or 6 wherein said starch is derived from a potato.
8. A composition according to anyone of claims 5 to 7 wherein said starch is cross-linked.
9. A composition according to anyone of claims 5 to 8
25 wherein said starch is stabilised.
10. An expanded foodstuff at least comprising a non-cereal amylopectin starch.
11. An expanded foodstuff according to claim 10 wherein said starch has an amylopectin content of at least 95 weight
30 percent based on dry substance.
12. An expanded foodstuff according to claim 10 or 11 wherein said starch is derived from a potato.
13. Use of a non-cereal amylopectin starch for the preparation of an expanded foodstuff.



14. Use according to claim 13 wherein said starch is modified.

15. Use according to claim 13 or 14 wherein said foodstuff is a snack.

5 16. Use according to anyone of claims 13 to 15 wherein said foodstuff comprises a coating.



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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P48546PC00	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/NL00/00165	International filing date (day/month/year) 10/03/2000	Priority date (day/month/year) 15/03/1999
International Patent Classification (IPC) or national classification and IPC A23L1/0522		
Applicant COÖPERATIEVE VERKOOP- EN PRODUCTIEVERENIGING VAN A		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 11/07/2000	Date of completion of this report 20.08.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Adechy, M Telephone No. +49 89 2399 8576 



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00165

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):
Description, pages:

1-13 as originally filed

Claims, No.:

1-15 with telefax of 15/01/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/NL00/00165

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-3,10
	No:	Claims	4-9, 11, 12-15
Inventive step (IS)	Yes:	Claims	1-3,10
	No:	Claims	4-9, 11, 12-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet



Re Item I

Basis of the opinion

An assumption was made concerning claims 10 and 11, in which reference is made to "claim 5", whereas it probably means "claim 9". The present report is based on this assumption.

Re Item V

Reasoned statement under Article 35 (2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1) Reference is made to the following documents:

- D1: US-A-4 634 596 (EASTMAN JAMES E.) 6 January 1987 (1987-01-06)
- D2: HOVENKAMP-HERMELINK J H M ET AL: 'ISOLATION OF AN AMYLOSE-FREE STARCH MUTANT OF THE POTATO (SOLANUM TUBEROSUM L.)' THEORETICAL AND APPLIED GENETICS, vol. 75, no. 1, 1 December 1987 (1987-12-01), pages 217-221, XP000610709 ISSN: 0040-5752 cited in the application
- D3: EP-A-0 565 386 (UNILEVER PLC.) 13 October 1993 (1993-10-13)
- D4: US-A-5 652 010 (GIMMLER ET AL.) 29 July 1997 (1997-07-29)
- D5: US-A-5 523 106 (GIMMLER ET AL.) 4 June 1996 (1996-06-04)

2) Novelty Art. 33 (1) and (2) PCT

The subject matter of claim 1, regarding a method for obtaining expanded food comprising at least a non-cereal amylopectin starch material, which contains itself more than 90% of amylopectin, where "at least part of" the composition is heated above its glass transition temperature and cooled to below the said temperature, is not disclosed in the cited documents and therefore is regarded as novel. The proportion of amylopectin in the non-cereal amylopectin starch in the claimed method is not derivable from the prior art. The same applies to dependent claims 2 and 3, which are regarded as novel in relation with independent claim 1 they refer to.

The subject matter of claims 4 and 9, concerns respectively, a composition comprising at least a non cereal amylopectin starch and an expanded food product comprising the



said starch composition. D5 discloses the subject matter of said claims, since expanded snacks are divulged (p.3-4, p. 11 lines 35-52, claims), comprising a non-cereal starch material (potato). It can be stressed that the use of a potato juice in the composition of D5 is regarded as a source of non-cereal amylopectin starch. D4 (p. 5-9, claims) also discloses such a composition as well as an expanded food, since the presence of a non-cereal amylopectin starch is found (e.g. potato starch is mentioned).

D1 (p.3, claims) and D2 (results and discussion) also disclose the subject matter of claim 4. D1 discloses a product containing starch from various origins, including potato starch, therefore the presence of "at least a non-cereal amylopectin" is explicitly disclosed. Also, D2 discloses a mutant free amylose potato, containing only amylopectin, therefore it discloses a composition comprising a non-cereal amylopectin. In addition, the description (e.g. on p. 5 line 14-15) acknowledges the fact that a potato is a source of amylopectin starch. It should be stressed that an expression such as "for use in preparing an expanded food stuff" is not regarded as technical features in the context of a product claim, and thus is not taken into account to analyse novelty (although such a product must be suitable for use in a particular manufacturing process). One could argue that the said document states that such a potato is analogous to waxy maize (on p. 220, lines 9-10), however, there is no details concerning the properties which are analogous, and no indication stating that it is not suitable for use in the claimed process.

The subject matter of dependent claims 5 and 6 is also disclosed in D2, where at least 95% of the starch is a non-cereal amylopectin starch and derived from potato, being an amylose free potato itself.

The subject matter of dependent claims 7 and 8 is also disclosed in D1, which mentions that the starch material can be cross-linked and also stabilised (derivatisation process for example).

The subject matter of claim 11 concerning the nature of the non-cereal starch is also divulged in D4 and D5.

The subject matter of dependent claim 10, concerning the percentage of the amylopectin content in the non-cereal amylopectin starch (of at least 95%) is not



divuligated in the cited document D5 and therefore is regarded as novel.

The subject matter of claim 12 concerns the use of a non-cereal amylopectin for making an expanded foodstuff. D4 (p. 5-9, claims) and D5 also disclose the subject matter of claim 12. Therefore, the subject matter of said claim is not regarded as novel, since the presence of a non-cereal amylopectin (from the potato) is involved in the whole process. The subject matter of dependent claims 13, 14 and 15 is also divuligated in the said documents. The starch would be modified with a step of heating, also food snacks are the object of the cited documents, and the presence of a coating is part of conventional manufacturing procedures.

3) Inventive step Art. 33 (1) and (3) PCT

The problem underlying the present invention concerns a process for producing an expanded food having improved rheological and organoleptic properties. The problem is solved by using essentially a non-cereal amylopectin starch in a specific amount and applying specific physical conditions. The closest prior art is D5 concerning also a process for expanding food. It differs from the present invention in that the proportion of non-cereal amylopectin starch is not disclosed and there is no indication on the use of such an amount to solve the problem of the present invention.

The subject matter of claim 1 is regarded as involving an inventive step, since there is no indication that such a process, involving the presence of 90% of amylopectin in the non-cereal amylopectin starch could be carried out in order to achieve the result of the present application. Therefore, such a combination would not be obvious to the skilled person. The same applies to the subject matter of dependent claims 2 and 3, which are also regarded as involving an inventive step in relation to independent claim 1 they refer to.

The subject matter of claim 10 is regarded as involving an inventive step, since none of the prior art indicates that such a proportion of amylopectin in the non-cereal amylopectin starch would solve the problem of the present application.

The subject matter of independent claims 4, 9, 12 and that of dependent claims 5-8, 11 and 13-15, lacks inventive step. Since said subject matter is divuligated in the cited prior



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL00/00165

art (see section 2)), it does not show where an inventive step could lie.

Re Item VIII

Certain observations on the international application

The term "expanded foodstuff" found in the claims, is not clearly delimited and therefore is covered by the scope of the cited documents (Art. 6 PCT). It should also be stressed that the product claims are defined in such a broad way that their subject matter is disclosed in the prior art cited documents, and many conventional expanded food are encompassed by the subject matter of said claims.

Expression such as "at least part of" , found in claim 1 is vague and renders the subject matter of said claim unclear (Art. 6 PCT).



New claims

1. A method for obtaining an expanded foodstuff having improved expansion characteristics, comprising the preparation of a composition at least comprising a non-cereal amylopectin starch, wherein said starch has an amylopectin content of at least 90 weight percent based upon dry substance,
5 heating at least part of said composition to a temperature above its glass transition temperature and letting it cool to a temperature below said glass transition temperature.
2. A method according to claim 1 wherein said composition is a dough.
- 10 3. A method according to anyone of claims 1 or 2 wherein said starch is derived from a potato.
4. A composition for use in preparing an expanded foodstuff, said composition at least comprising a non-cereal amylopectin starch.
5. A composition according to claim 4 wherein said starch has an amylopectin
15 content of at least 95 weight percent based on dry substance.
6. A composition according to claim 4 or 5 wherein said starch is derived from a potato.
7. A composition according to anyone of claims 4 to 6 wherein said starch is cross-linked.
- 20 8. A composition according to anyone of claims 4 to 7 wherein said starch is stabilised.
9. An expanded foodstuff at least comprising a non-cereal amylopectin starch.
10. An expanded foodstuff according to claim 5 wherein said starch has an amylopectin content of at least 95 weight percent based on dry substance.
- 25 11. An expanded foodstuff according to claim 5 or 10 wherein said starch is derived from a potato.



Now page 2

12. Use of a non-cereal amylopectin starch for the preparation of an expanded foodstuff.
13. Use according to claim 12 wherein said starch is modified.
14. Use according to claim 12 or 13 wherein said foodstuff is a snack.
- 5 15. Use according to anyone of claims 12 to 14 wherein said foodstuff comprises a coating.

